

# MOUNTAIN LAUREL (*KALMIA LATIFOLIA* L.) DISTRIBUTION IN MASSACHUSETTS

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## ABSTRACT

Mountain laurel (*Kalmia latifolia* L.) presence along roads was mapped extensively for the whole state and intensively for selected quadrangles. Presence of mountain laurel in selected forests was determined from plots along transects. Frequency of mountain laurel was calculated as the per cent of road distance mapped, or of plots taken, that had laurel present. Mountain laurel occurred throughout the state on a range of sites, except for Cape Cod and eastern Plymouth County, in the high Berkshires and in the far west and north-west. Mountain laurel was uncommon in eastern Massachusetts and in a north-south strip through central Massachusetts, but was otherwise abundant. Absence of mountain laurel was probably due to either fire history, maritime influence, cold winters, or basic soils. Low frequencies were probably due to a previous history of extensive land clearing for agriculture.

Mountain laurel (*Kalmia latifolia* L.) is an evergreen shrub widely distributed in Massachusetts (Ebinger, 1974) even though it is near its northern limit (Kurmes, 1967). We have studied the details of local distribution related to site factors in central Massachusetts (O'Keefe, 1981). Our objective in the present study was to survey the whole state of Massachusetts to see where mountain laurel grows naturally. Our primary method was to map mountain laurel visible from automobiles while driving when deciduous species were leafless and the evergreen mountain laurel was conspicuous. We mapped the whole state on small scale maps and portions of the state on larger scale maps. We also incorporated data from site studies that used plots along transects in various forests. The results of the mapping and plot studies were then combined to interpret state-wide variations in the occurrence of mountain laurel.

## METHODS

We mapped mountain laurel from November to April in 1979–1980 and 1980–1981. One person drove at 40–60 km/hr and observed mountain laurel on both sides of the road, the other helped observe and marked mountain laurel presence on maps. The extensive survey of state-wide distribution used USGS 1:250,000 maps; the intensive survey of portions of the state used USGS 1:24,000



maps (quadrangles). The resolution of the surveys, the minimum distance between mountain laurel plants that permits individual marks on the map rather than marking as continuous cover, was approximately 500 m for the extensive survey and 50 m for the intensive survey. For extensive mapping we tried to select representative roads that sampled the non-urbanized areas of the state. For the intensive survey we selected quadrangles within easy distance of Amherst, MA and drove on all of the passable roads in each quadrangle.

The per cent of mountain laurel on maps was determined by measuring on the maps the total distance marked as having mountain laurel and dividing by the total distance mapped. The extensive survey mapped only roads outside urbanized areas (yellow on the 1:250,000 maps). The intensive survey mapped only roads through wooded areas (green on the 1:24,000 maps). These percentages are only for comparative purposes on maps of the same scale.

Plot data from forests were taken at regular intervals along equally spaced transects that sampled the entire forest. Data from Monroe and Hawley-Savoy State Forests are from a study by Hibbs (1978) using 0.01 ha plots. Data from the other 6 forests came from a study by O'Keefe (1981) using 0.02 ha plots.

#### RESULTS

In the extensive survey we mapped about 1,800 km of road and 21% had mountain laurel. The state was composed of regions of differing mountain laurel distribution (Fig. 1, Table 1). As generally noted by others (Ebinger, 1974), we found no mountain laurel on Cape Cod or eastern Plymouth County. In eastern Massachusetts, roughly east of Worcester and an urbanized area, mountain laurel was scarce, although it was observed on a few rocky hills to the north and in some swampy areas to the south. Mountain laurel was common (about 40%) west of Worcester to the Connecticut River (region III) and in the Berkshires (region V), with the marked exception of a north-south strip in western Worcester county and south of the Quabbin reservoir west to the Connecticut river. There, mountain laurel was scarce generally, although it was locally abundant in some swampy areas and pond margins. Mountain laurel was less common in the northern Berkshires than in the southern Berkshires. In far western Massachusetts, the northern Housatonic valley, Hoo-



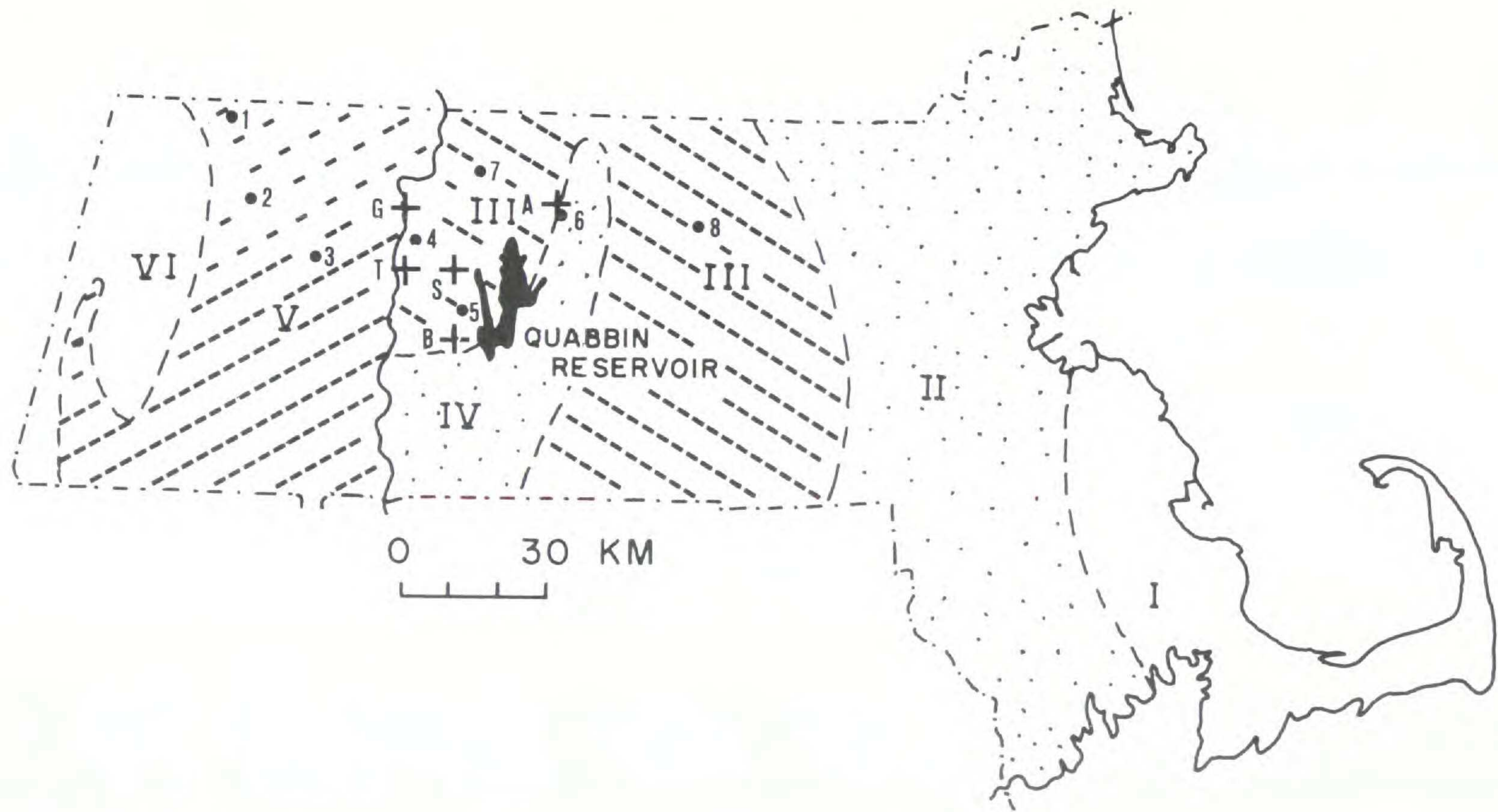


Figure 1. Distribution of mountain laurel in Massachusetts. The center of each quadrangle intensively mapped is marked by a + and identified with a letter (G = Greenfield, T = Mt. Toby, S = Shutesbury, B = Belchertown, A = Athol). Forests sampled with plots are marked by numbers (1 = Monroe, 2 = Hawley-Savoy, 3 = D.A.R., 4 = Mt. Toby, 5 = Cadwell, 6 = Harvard, 7 = Erving, 8 = Leominster). Blank areas (I and VI) had no mountain laurel, stippled areas (II and IV) had mountain laurel, but it was uncommon, in hatched areas (III and V) mountain laurel was common at least along roads.



Table 1. Distribution of mountain laurel in different regions of Massachusetts. See Figure 1 for boundaries of the regions.

Region	% mountain laurel	Total km mapped
I Cape Cod and E. Plymouth County	0	157
II Eastern Mass.	3	506
III E. Worcester County and N. of Quabbin Res.	38	303
IV W. Worcester County + S. of Quabbin Res.	2	161
V Berkshires	45	367
VI Far west	8	212

sic valley, and Mount Greylock to the north, and the Taconic range along the New York border had no mountain laurel. Mountain laurel does occur on parts of a rocky ridge that extends north into the Housatonic valley south of Pittsfield (Fig. 1).

Greenfield, Mt. Toby, and Shutesbury quadrangles were all in region III where mountain laurel was abundant. They had about 40% mountain laurel along the roads (Table 2). The Mt. Toby quadrangle has about 50% agricultural land in the Connecticut river valley, therefore the total distance mapped is lower than in the other two quadrangles, but the percentage of mountain laurel in the wooded portions of the three quadrangles was about the same (Table 2).

Belchertown and Athol quadrangles were primarily in region IV where mountain laurel was scarce. The intensive survey found only 11-14% mountain laurel in these quadrangles. The Athol quadrangle showed a sharp discontinuity between the southwest corner, where mountain laurel was very abundant, and the rest of the quadrangle where it was scarce (Table 2). This discontinuity was along the boundary between regions III and IV (Fig. 1) where mountain laurel was respectively abundant and scarce. In the areas where mountain laurel was generally scarce in the Athol quadrangle it was locally abundant in, or near, a few swampy areas.

Three of the quadrangles could be subdivided into different physiographic areas (Table 2). The Greenfield quadrangle contains the Montague sand plain, an area of deep sands, frequently burned, with pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*)



stands similar to Cape Cod. Although mountain laurel was scarce on the sand plain, it did grow there. The Mt. Toby quadrangle contains extensive, flat, wooded swamps on the west side of the Connecticut river. Mountain laurel was just as abundant in these swamps as in the rest of the wooded portion of the quadrangle, predominantly rocky hills. In the Belchertown quadrangle mountain laurel was equally common in the rocky Pelham hills, where it is very dense in some areas, and in the valley floors of Granby and Belchertown. The Shutesbury quadrangle is almost entirely rocky hills and mountain laurel was abundant on the whole quadrangle.

The data for mountain laurel occurrence in State Forests (Table 3) are not biased towards roadside observations as are the maps. Generally the data from plots were consistent with the location of the forest in the regions of the state delineated by the extensive mapping. Both Monroe and Hawley-Savoy State Forests are at high altitudes (700–800 m) in the northern Berkshires and neither had any mountain laurel. The D.A.R. state forest is in the central Berkshires, at lower elevation (500m) and 13% of the plots had mountain laurel. The Harvard Forest is in region IV, where mountain laurel is

Table 2. Distribution of mountain laurel in selected quadrangles. See Figure 1 for location of quadrangles.

Quadrangle	% mountain laurel	Total km mapped
Greenfield	36	72
Sand plain	3	5
Remainder	38	67
Mt. Toby	37	35
Swamp	38	11
Remainder	34	24
Shutesbury	42	58
Belchertown	14	63
Hills	14	50
Valleys	14	13
Athol	11	88
SW corner	64	11
Remainder	3	77



Table 3. Distribution of mountain laurel in selected forests. Numbers of the forests refer to their numbers on Figure 1.

Forest	% mountain laurel	Total number of plots
1 Monroe	0	191
2 Hawley-Savoy	0	213
3 D.A.R.	13	270
4 Mt. Toby	34	395
5 Cadwell	32	620
6 Harvard	10	615
7 Erving	41	470
8 Leominster	79	370

scarce, and it had only 10% mountain laurel. The other forests are in region III where mountain laurel was abundant and all had more than 30% of the plots with mountain laurel. In many parts of Leominster state forest, where mountain laurel was the most abundant we encountered, the mountain laurel formed almost impenetrable thickets covering many hectares.

#### DISCUSSION

Mountain laurel grows naturally in most of Massachusetts, with three exceptions. We did not observe it on Cape Cod or eastern Plymouth County, in the high portions of the northern Berkshires, or in northwestern Berkshire county and the Taconic range. It is generally assumed that mountain laurel is absent from Cape Cod due to the past history of severe fires. In Rhode Island, fire eliminated large mountain laurel and greatly reduced the relative density of small ones (Brown, 1960). We did observe mountain laurel growing on a site similar to Cape Cod, the Montague sand plain, where fires are common, so additional maritime factors may be important on Cape Cod. Mountain laurel presumably cannot grow in the high Berkshires because of the cold winters. It does occur throughout most of the Berkshires at lower elevations. Limitation by the cold winters is also consistent with the fact that the northern limit for the species is in southern Vermont and New Hampshire. The lack of mountain laurel in northwestern Berkshire county is probably related to the general decreased acidity of the soil (USDA, 1973). Mountain laurel generally prefers acid soils (Braun, 1961).



Within those areas of Massachusetts where mountain laurel grows it can be found on almost any site, from deep sands, to swamps, to rocky hillsides. Yet, despite its adaptability, it is uncommon both east of Worcester and in a strip through western Worcester county and south of the Quabbin reservoir. In both areas where it is generally uncommon it can still be locally abundant.

The major factor that probably makes mountain laurel generally uncommon in some areas is land use history. If land has been cleared of forest, mountain laurel is extremely slow to re-invade when the land is abandoned (O'Keefe, 1981). Mountain laurel has stringent seed bed requirements, usually moss, and the seeds do not spread far from the parent plant (Kurmes, 1961). As a result, mountain laurel is usually found either in or near areas that were never cleared of forest during the height of agriculture in the 1800's (O'Keefe, 1981). Consequently, mountain laurel can provide a clue to past land use, but it is not, by itself, an adequate indicator of non-cleared land. For the same reason, mountain laurel may be abundant locally in swamps or on rocky slopes that, because they were never cleared, served as refugia for the mountain laurel. The eastern part of the state is, and has been, highly populated and relatively flat so most of the land has probably been cleared and mountain laurel distribution is severely restricted. The strip in central Massachusetts where mountain laurel is scarce is not highly populated, but it was extensively cleared in the 1800's (Raup & Carlson, 1943). In the area of the Brookfields, south and east of the Quabbin reservoir, there are still a large number of farms on top of the rolling hills. The present distribution of mountain laurel at the Harvard Forest coincided almost exactly with land that was never cleared in the past (O'Keefe, 1981). There may be other factors limiting mountain laurel distribution in this central portion of the state, but land use history is probably the major factor.

It is difficult to determine the overall bias introduced by the mapping techniques used in this study. A survey from automobiles gives a sample that is potentially biased in several ways: small plants cannot be seen from moving automobiles, the edges of roads have relatively high light intensities that favor the growth of mountain laurel, road banks may create favorable seeds beds for mountain laurel establishment, roads tend to pass through populated areas with more intensive land use history, roads tend to be in valleys rather than on hill tops. Interstate highways avoid some of these



biases, but there are not enough of them and it is unsafe to drive slowly. Mountain laurel undoubtedly grows in some areas where we saw none from the roads. The results of mapping in this study agree quite well with the results of studies using plots, so we assume that the bias introduced by the mapping technique is relatively unimportant.

#### ACKNOWLEDGMENTS

We thank Mark Dale, Anne Hine, Gary Kronrad, Karen Saunders, and Mary Alice Wilson for assistance in mapping. Supported by Massachusetts Agricultural Experiment Station Grant McIntire-Stennis 32.

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